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Milano, January 8, 1999

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Re.: New US Application of Small Entity
in the name of Roberto RESTA

Agent's Docket: 31808/GM/vp

Hon.
COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON D.C. 20231
U.S. A.

Transmitted herewith are the following papers for filing a new Application:

1. Specification and claims; Declaration, Power of Attorney and Petition duly signed January 4, 1999 and attached thereto.
2. Three drawings on strong paper accompanying the specification (M.P.E.P. 608.02-rev. 81)
3. Deposit Account order for filing fee: US\$ 380.= dated Jan. 8, 1999 (dupl.)
4. Deposit Account order for Assignment fee: US\$ 40.= dated Jan. 8, 1999
5. Assignment of the invention to RESTA S.r.l.
6. Small Entity Verified Statement

The priority of the here-under listed Application(s) is respectfully claimed:
- Italian Appln. for Invention No. B098A000021 filed January 23, 1998
~~xxxxxxxxxxxx~~ ~~xxxx~~ ~~xxxx~~

A Certified Copy of the priority Application ~~(which has been certified)~~ is attached.

Please place of record in the file the enclosed papers and kindly acknowledge safe receipt thereof; moreover please readily collect the credit specified in the Deposit Account order, so as to allow the Application to receive the earliest possible filing date, however within: JANUARY 23, 1999.

Respectfully submitted

Guido MODIANO
(Reg. No. 19,928)

Enclosures:

- Spec/claims+Combined Declaration/Power
- Formal drawings (Three)
- Assignment+Assignment fee Dep. Acc. order
- Filing fee Dep. Acc. order (duplicate)
- Certified Copy
- Small Entity Verified Statement

THIS FORM MAY BE USED FOR REPRODUCTION PURPOSES. IT WILL NOT BE
REPRINTED BY THE PATENT OFFICE FOR DISTRIBUTION.

Case Docket No. 31808/GM/vp

THE COMMISSIONER OF PATENTS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the Patent Application of:

SMALL ENTITY

Inventor: Roberto RESTA


For: QUILTING MACHINE WITH STITCHERS MOVED BY LINEAR ELECTRIC MOTORS

Enclosed are:

- ☒ Small Entity verified Statement.
- ☒ Three sheets of drawing on strong paper (M.P.E.P. 608.02 - rev.81)
- ☒ An Assignment of the Invention to RESTA S.r.l.
- ☒ A Certified Copy of an Italian Patent Application
- ☐ Associate Power of Attorney

CLAIMS AS FILED					
	(1) for	(2) number filed	(3) number extra	(4) rate	(5) basic fee \$ 380.=
Total claims		2 - 20 =		x\$ 9.=	
Independent claims		1 - 3 =		x\$ 39.=	
				Total filing fee	US\$ 380.=

- ☒ Please charge my Deposit Account No. 13-3860 in the amount of US\$ 380.=. A duplicate copy of this sheet is enclosed.
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Account No. 13-3860. A duplicate copy of this sheet is enclosed.
- ☐ A check in the amount of _____ to cover the filing fee is enclosed.


Guido MODIANO
Attorney of Record

Milan, Italy
January 8, 1999

VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN

Docket Number (Optional):
31808/GM/vp

Applicant or Patentee: Roberto RESTA

Application or Patent No.: _____

Filing Date or Issue Date: _____

Title: QUILTING MACHINE WITH STITCHERS MOVED BY LINEAR ELECTRIC MOTORS

I hereby declare that I am

☐ the owner of the small business concern identified below:

☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN RESTA S.r.l.

ADDRESS OF SMALL BUSINESS CONCERN Via Morgagni 33 - 48018 FAENZA - ITALY

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

☒ the specification filed herewith with title as listed above.

☐ the application identified above.

☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization having any rights in the invention is listed below:

☒ No such person, concern, or organization exists.

☐ Each such person, concern or organization is listed below:

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Roberto RESTA, Managing Director

TITLE OF PERSON IF OTHER THAN OWNER Via Ospitalacci 82 - 48018 FAENZA - ITALY

ADDRESS OF PERSONS SIGNING _____

SIGNATURE _____

DATE January 4, 1999

0 1 2 3 4 5 6 7 8 9

TO ALL WHOM IT MAY CONCERN:

Roberto RESTA, Italian citizen, of FAENZA - ITALY

QUILTING MACHINE WITH STITCHERS MOVED BY LINEAR ELECTRIC

of which the following description in connection with the accompanying drawings is a specification, like reference characters on the drawings indicating like parts in the several figures.

BACKGROUND OF THE INVENTION

The present invention relates to a quilting machine with stitchers moved by linear electric motors.

It is known that a quilting machine comprises a cloth supporting carriage and one or more stitchers for quilting
5 the cloth according to a preset pattern.

In most currently commercially available quilting machines the cloth supporting carriage moves along a linear path, while the stitchers are mounted so that they are slideable on a frame and are guided at right angles to the
10 path of the carriage. The combination of the movements of the carriage and of the stitchers allows the sewing needle to move with two degrees of freedom in order to form a seam which follows the intended path.

In such quilting machines, the frame comprises a first
15 beam, which lies above the cloth, and a second beam, which is parallel to said first beam and lies below the cloth.

The first beam supports a guide for the sewing head of the stitcher, while the second beam supports a guide for the so-called "crochet" device.

20 In order to allow the sewing needle to operate concordantly with the hook assembly, mechanical transmissions and/or electrical connections are provided so that the sewing needle moves synchronously and in perfect vertical alignment with the hook assembly during its
25 movements over the cloth.

Said conventional devices have rather long response

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times and operating limitations when it is necessary to manage a plurality of stitchers which operate simultaneously on the same cloth.

SUMMARY OF THE INVENTION

The aim of the present invention is to provide a
5 quilting machine which does not suffer the drawbacks of
conventional ones, i.e., which is capable of ensuring the
alignment of the sewing head with the hook assembly
precisely by using means which have a simple structure and
high reliability.

10 Within the scope of this aim, an object of the present
invention is to provide a quilting machine comprising a
plurality of stitchers which is actuatable so as to work
independently of each other to form variously arranged
seams.

15 This aim is achieved with a quilting machine which
comprises a frame composed of a first beam, arranged
horizontally above the cloth to be quilted, and of a second
beam arranged below said cloth, said beams being provided
with respective guides for the carriages that support the
20 sewing head and respectively the hook assembly of at least
one stitcher, characterized in that in order to move said
sewing head and said hook assembly of said stitcher there
are respective linear motors, in which the inductor
elements are arranged on said upper beam and lower beam,
25 respectively, and the armature windings are arranged on
said carriages that support the sewing head and said hook
assembly respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present

invention will become apparent from the following detailed description of a preferred embodiment, illustrated by way of non-limitative example in the accompanying drawings, wherein:

5 Figure 1 is a perspective view of a frame for supporting the stitchers in a quilting machine;

 Figure 2 is a sectional view, taken along the plane II-II of Figure 1;

 Figure 3 is a front view of the frame, schematically
10 showing the arrangement of the inductor and of the armature of the linear motors.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

 With reference to the above Figures, 1 designates the frame of a quilting machine which is composed of two horizontal beams 2 and 3 which are connected, at their
15 opposite ends, by two respective vertical posts 4 and 5.

 The beams 2, 3 and the posts 4, 5 enclose an opening 6, through which the cloth 7 to be quilted is guided. For the sake of clarity, it is assumed that the cloth 7 is stretched horizontally on a supporting frame (not shown)
20 which is movable in the direction A at right angles to the frame 1.

 Two mutually parallel cylindrical bars 8, 9 are fixed to the ends of the beam 2 and are spaced from said beam. The bars 8 and 9 form a guide along which a carriage 10 is
25 slideable; said carriage is meant to support the sewing head 11 of a stitcher which is generally designated by the reference numeral 12. Sliding is ensured by a pair of freely rotating wheels 13 and 14 which have hollow rims and are tangentially engaged above the bar 8 and below the bar

9.

The inductor magnets 15 of a linear motor are fixed to the face of the beam 2 that is adjacent to the bars 8, 9; their armature winding 16 is fixed to the carriage 10 and protrudes between the bars 8 and 9. The activation of the linear motor 15, 16 causes the movement of the carriage 10 and therefore of the sewing head 11 along the guide 8, 9 in the direction B, at right angles to the direction A in which the cloth moves.

10 The stitcher 12 comprises a hook assembly 17 which is actuated synchronously with the sewing head 11. The device 17 is mounted on a carriage 18 which, by means of pairs of wheels with hollow rims 19 and 20, is slideable in the direction B along a pair of bars 21 and 22 which are fixed by their ends to the lower beam 3 and are parallel to the bars 8 and 9.

15 The lower carriage 18 is moved by a linear motor of its own, which is composed of inductor magnets 23 and of an armature winding 24. The inductor magnets 23 are fixed to the front face of the beam 3, which is directed toward the bars 21 and 22, while the armature winding 24 protrudes between said bars in order to cooperate with the inductor magnets 23.

20 The operation of the quilting machine is illustrated hereinafter with reference to Figure 3, which is a view of an embodiment which comprises two stitchers, which are of the type designated by the reference numeral 12 in the example of Figures 1 and 2 and are designated by the reference numerals 12a and 12b. The sewing heads and hook assemblies that compose the stitchers 12a, 12b and the

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corresponding supporting carriages are designated by the same reference numerals used earlier in the example of Figures 1 and 2, with the addition of the letters a and b respectively.

5 The carriages 10a, 10b and 18a, 18b are actuated by a linear motor of their own, which is composed of an inductor 16a, 16b and 24a, 24b and of inductor magnets which, since they are common to both motors, are designated by the reference numerals 15 and 23, as in the previously
10 described example.

In Figure 3, the numerals 25a and 25b schematically designate the two electric motors that operate the needles of the sewing heads 11a, 11b, and the numerals 26a and 26b schematically designate the two electric motors that
15 operate the hook assemblies 17a, 17b and which, in Figure 1 of the previously described example, have been designated by the reference numerals 25 and 26; said motors move the needle of the sewing head 11 and the hook assembly 17 by means of belt drives 27 and 28.

20 The armature windings of the linear motors 16a, 15 and 16b, 15 that operate the sewing heads 11a, 11b, the armature windings of the linear motors 24a, 23 and 24b, 23 that operate the hook assemblies 17a, 17b, and the motors 25a, 25b, 26a, 26b are powered by way of respective power
25 stages 29 and 30 controlled by a CNC (computerized numeric control) unit 31.

The unit 31 is capable of driving the stitchers 12a, 12b independently of each other, so as to ensure maximum operating versatility as regards the paths of the seams
30 formed by said stitchers. In particular, the linear motors

ensure perfect synchronization and perfect vertical alignment of the needles and of the crochet.

It is further possible to adjust the speed of the motors 25a, 25b, 26a, 26b so as to maintain a constant
5 stitch length regardless of the direction B in which the stitchers 12a, 12b move with respect to the direction A in which the cloth 7 moves.

Numerous modifications and variations are possible in the practical embodiment of the invention, and all are
10 within the scope of the same inventive concept. For example, instead of moving the cloth 7 with respect to the frame 1, it is possible to keep the cloth motionless and move the frame 1 on rails in the direction A.

The disclosures in Italian Patent Application No.
15 BO98A000021 from which this application claims priority are incorporated herein by reference.

2025 RELEASE UNDER E.O. 14176

WHAT IS CLAIMED IS:

1 1. A quilting machine for quilting cloth, comprising:
2 a frame composed of a first upper beam, arranged
3 horizontally above a cloth to be quilted, and of a second
4 lower beam arranged below said cloth; at least one stitcher
5 having a sewing head and a hook assembly; carriages for
6 supporting respectively said sewing head and said hook
7 assembly; said carriages being movable along said beams;
8 guide means provided at said beams for guiding said
9 carriages during movement thereof; and driving linear
10 motors having inductor elements, which are arranged at said
11 upper beam and lower beam respectively, and armature
12 windings which are arranged at said carriages that support
13 said sewing head and said hook assembly respectively, said
14 linear motors driving said carriages for movement along
15 said beams.

1 2. The quilting machine of claim 1, comprising:
2 electrical motors for driving the sewing heads and the hook
3 assemblies; power stages; and a computerized numeric
4 control unit CNC, said armature windings of the linear
5 motors and said electrical motors that drive the sewing
6 head and the hook assembly being powered by way of said
7 power stages which are controlled by said computerized
8 numeric control unit.

ABSTRACT OF THE DISCLOSURE

A quilting machine which comprises a frame composed of a first beam, arranged horizontally above the cloth to be quilted, and of a second beam arranged below the cloth, the beams being provided with respective guides for the 5 carriages that support the sewing head and respectively the hook assembly of at least one stitcher, characterized in that in order to move the sewing head and the hook assembly of the stitcher there are respective linear motors, in which the inductor elements are arranged on the upper beam 10 and lower beam, respectively, and the armature windings are arranged on the carriages that support the sewing head and the hook respectively.

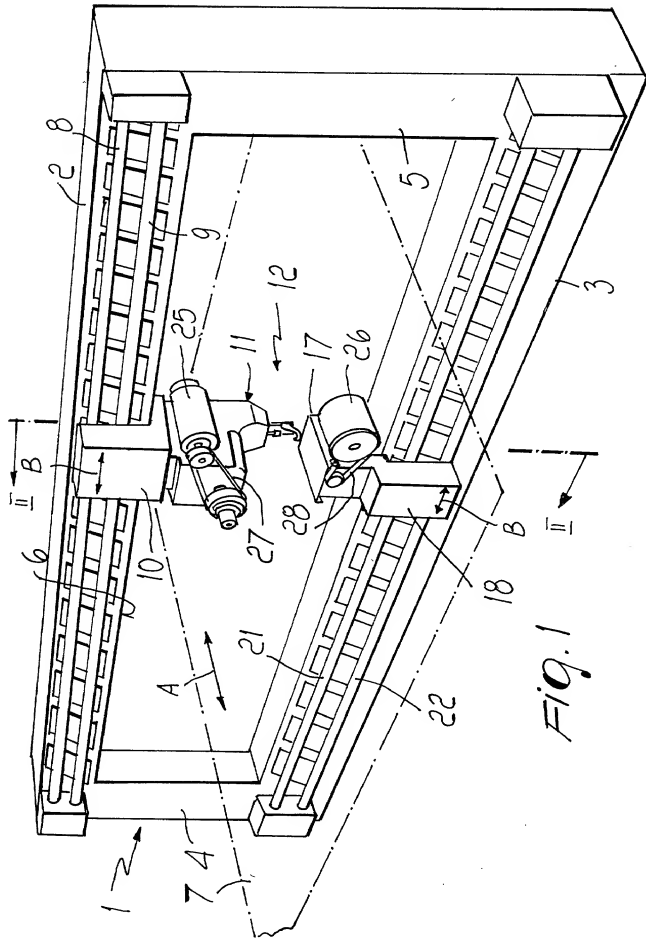
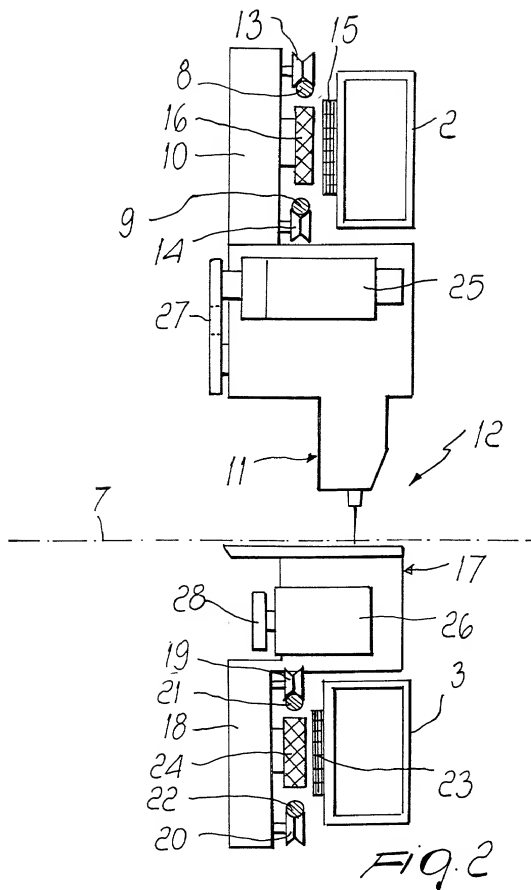
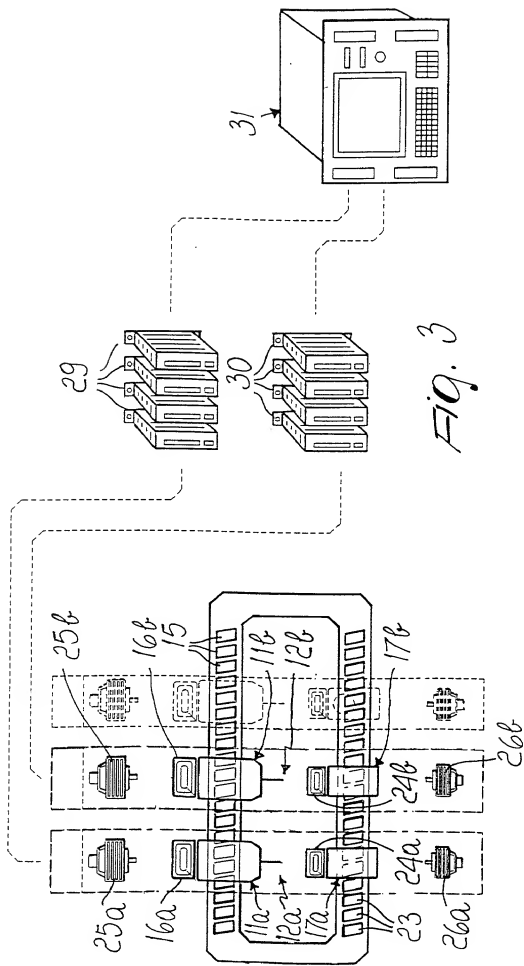


Fig. 1





Declaration and Power of Attorney for patent Application

Dichiarazione e procura ai fini della domanda di brevetto

Italian Language Declaration

Docket No. 31808/GM/vp

Il sottoscritto inventore dichiara che:

La propria residenza, recapito postale e cittadinanza corrispondono a quanto indicato in calce, sotto la propria firma.

Ritiene di essere il primo ed unico inventore originale (se viene elencato in calce un solo nominativo) o il coinventore primo ed originale (se è elencato più di un-nominativo) del oggetto rivendicato e per il quale il sottoscritto presenta domanda di brevetto. La invenzione in questione è chiamata

MACCHINA TRAPUNTATRICE CON CUCITRICI MOVIMENTATE DA MOTORI ELETTRICI LINEARI

e la sua descrizione è allegata alla presente Dichiarazione a meno che non sia spuntata la seguente casella:

☐ Il _____ è stata depositata una domanda di brevetto statunitense numero o una domanda di brevetto internazionale PCT numero _____ che è stata modificata il _____ (se applicabile).

Il sottoscritto dichiara in oltre di aver letto e compreso il contenuto della descrizione identificata in precedenza, rivendicazioni comprese, come modificati dall'eventuale modifica summenzionata.

Il sottoscritto riconosce l'obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Docice dei Regolamenti Federali, §1.56.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

QUILTING MACHINE WITH STITCHERS MOVED BY LINEAR ELECTRIC MOTORS

the specification of which is attached hereto unless the following box is checked:

☐ was filed on _____ as United States Application Number or PCT International Application Number _____ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

Italian Language Declaration

Il sottoscritto rivendico con la presente la priorità prevista dal Titolo 35, Codice degli Stati Uniti, § 119(e)-(d) o § 365(a) in relazione a qualsiasi domanda o domande estere di brevetto o certificato di inventore, o dal Titolo 35, § 365(a) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale è designato almeno un paese diverso dagli Stati Uniti, i suddetti domande e certificati essendo elencati sotto, e, spuntando le seguenti caselle, ha anche identificato sotto qualsiasi domanda estera di brevetto o certificato di inventore, o domanda internazionale PCT, la cui data di deposito preceda quella della domanda per la quale è rivendicata la priorità.

Prior foreign application(s)

Domande Estere Anteriori

B09BA000021

(Number)

(Numero)

ITALY (ITALIA)

(Country)

(Nazione)

(Number)

(Numero)

(Country)

(Nazione)

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codici degli Stati Uniti, § 119(e), in relazione a qualsiasi domanda o domande provvisorie degli Stati Uniti elencate sotto.

(Application No.)
(N° della domanda)

(Filing Date)
(Data di deposito)

(Application No.)
(N° della domanda)

(Filing Date)
(Data di deposito)

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codice degli Stati Uniti, § 120, in relazione a qualsiasi domanda o domande statunitensi, o dal Titolo 35, § 365(c) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale sono designati gli Stati Uniti, i suddette domande essendo elencate sotto e, nella misura in cui l'oggetto di ciascuna rivendicazione di questa domanda non sia stato esposto nella domanda statunitense o internazionale PCT anteriore nel modo previsto dal primo paragrafo del Titolo 35, Codice degli Stati Uniti, § 112, riconosce l'obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codici dei Regolamenti Federali, § 156, le quali diventino disponibili durante il periodo compreso tra la data di deposito della domanda anteriore e la data di deposito nazionale o internazionale PCT della presente domanda.

(Application No.)
(N° della domanda)

(Filing Date)
(Data di deposito)

(Application No.)
(N° della domanda)

(Filing Date)
(Data di deposito)

Con la presente, il sottoscritto dichiara veritiera tutte le affermazioni contenute in questa domanda in relazione alle proprie conoscenze e di ritenere vere tutte le affermazioni o informazioni presentate. Dichiara inoltre che tali asserzioni sono state espresse nella piena consapevolezza che le dichiarazioni intenzionalmente false sono punibili con una multa, l'incarcerazione o entrambe, ai sensi della Sezione 1001 del Titolo 18 del Codice degli Stati Uniti e che tali dichiarazioni intenzionalmente false possono mettere a repentaglio la validità della domanda o di qualsiasi brevetto rilasciato in merito.

I hereby claim foreign priority benefits under Title 35, United States code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed:

Priority not claimed

Diritto di priorità non rivendicato

23 Jan. 1998 (23.1.1998)

(Day/Month/Year Filed)

(Giorno, Mese/Anno di deposito)

(Day/Month/Year Filed)

(Giorno, Mese/Anno di deposito)

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Status) (patented, pending, abandoned)

(Stato) (concessione de brevetto, in corso di esame, abbandono)

(Status) (patented, pending, abandoned)

(Stato) (concessione de brevetto, in corso di esame, abbandono)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

ian Language Declaration

OCURA: Io, sottoscritto inventore, nomino con la presente il seguente
acato o avvocati e/o agente o agenti al fine di istruire questa pratica e di
durre tutte le operazioni ad essa pertinenti presso l'Ufficio dei Brevetti e
rchi di Fabbrica: (Elencare il nome ed il numero di matricola)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the
following attorney(s) and/or agent(s) to prosecute this application and
transact all business in the Patent and Trademark Office connected
therewith: (list name and registration number)


Guido MODIANO (Reg. No. 19,928)
Albert JOSIF (Reg. No. 22,917)
Daniel J. O'BYRNE (REG. No. 36,625)

re le corrispondenza a:

MODIANO & ASSOCIATI
Via Meravigli, 16
20123 MILANO - ITALY - EUROPE

onare a:

(02) 86.92.442

ome e cognome dell'unico o del primo inventore Roberto RESTA	Full name of sole or first inventor Roberto RESTA
ma dell'inventore 	Inventor's signature
Data 4.1.1999	Date January 4, 1999
idenza 48018 FAENZA - ITALY	Residence 48018 FAENZA - ITALY
Via Ospitalacci 82	Via Ospitalacci 82
ttadinanza Italiana	Citizenship Italian
capito o Casella Postale ome Residenza	Post Office Address same as Residence
me e completo dell'eventuale secondo coinventore	Full name of second or joint inventor
ma del secondo inventore	Inventor's signature
Data	Date
idenza	Residence
ttadinanza	Citizenship
capito o Casella Postale ome Residenza	Post Office Address same as Residence

ire le stesse informazioni e le firme del terzo e degli ulteriori
ventori.)

(Supply similar information and signature for third and sub-sequent joint
inventors.)